FOREWARD

Forest insects and diseases are ranked nationwide as the principal destructive agents of timber. Combined, they destroy 7.3 billion board feet of timber annually and cause a loss in volume growth of 21.2 billion board feet. The timber destroyed by pests each year is roughly equivalent to half the present annual cut from the National Forests and is four to five times the amount destroyed by fire. Young trees and reproduction also sustain high but unmeasurable losses even more serious than the destruction of old growth because they are the forests of the future. Thus, forest protection is a two-sided blade: one to protect the supply of sawtimber and other forest products for the immediate years, and one to assure forests for future generations.

The Region's Forests are vital to its economy, and sustained protection is essential to maintain a healthy industry. Thus, protection indirectly helps stabilize dependent communities and the price of forest products. Equally as important, it preserves the esthetic and scenic values of the forests, protects the wildlife habitat and the watersheds, and prevents costly timber salvage programs from areas on which the timber crop has been destroyed.

The threat of forest pests is constantly with us; but through combined vigilance, skillful attack, and continuous additions to our knowledge on how best to combat them, the damage they cause can be held to the lowest possible levels with the least possible impact on other resources. Control costs are high; but weighed against values being protected, they usually are judged well worth the expenditure of public funds.

I. THE OBJECTIVES AND BENEFITS OF FOREST PROTECTION FROM PESTS.

OBJECTIVES

* To provide a sustained supply of wood products.
* To protect useable water for hydroelectric power, industrial and domestic use, and fish and aquatic-life habitat.
* To protect meadows, grass, brushlands, and other forage areas for wildlife and domestic livestock.
* To provide a suitable habitat for fish and wildlife.
* To provide scenic areas for camping, vacationing, and recreation.
* To reduce resource-threatening insect infestations and forest diseases to the lowest possible level consistent with public safety, high economy, and good multiple-use land management.
* To test promising new control methods, screen new, safer pesticides and biological suppression agents, to study carefully any indications of damage to other resources, and to adjust control techniques to prevent it.
* To conduct all pest control activities safely without loss of life and at the most favorable public cost-benefit ratio.

BENEFITS

* Forest esthetic and wildlife habitat values are protected.
* Timber stumpage values ranging from $100 to more than $1,000 per acre are protected.
* Sustained allowable timber harvest can be maintained. Community stability is not endangered.
* A costly crash timber salvage program yielding lower quality lumber is avoided.
* Forest fire hazards are reduced through the preservation of living trees. A forest of standing and down, dead timber presents a high fire hazard, an impediment to game and livestock use, and a hazard to travel.

II. PUBLIC REGULATORY CONTROL OF PESTICIDES.

Regulation of the use of pesticides in agriculture and forestry dates from the adoption of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947. This was followed by the 1954 Miller Amendment to the Federal Food, Drug, and Cosmetic Act. These laws acknowledge the tremendous expansion of pesticide use to meet the needs for increased agricultural and natural resource production. They provide the controls necessary for the production

of an adequate, wholesome, and economic food supply and for public protection in the handling and use of insecticides.

To be considered suitable for use, a pesticide must pass laboratory tests demonstrating: (1) its effectiveness against specific pests when used as proposed, (2) an absence of harmful effects against the plants or trees on which it is needed, (3) safety for preserving the productivity of the soil and the beneficial soil organisms, and (4) preservation of the quality of the products being protected.

In addition to the above action, the Government has taken further steps to protect water values and wildlife and fish resources in forests or other areas being sprayed. Tests called bioassays are made of all pesticides licensed for use. These tests, in which animals and fish are used, ascertain such effects as sensitivity, toxic dosages, effects on skin, eyes, and other organs, and physical and mental effects generally.

The protection by the public of fish and wildlife resources was given further impetus by passage September 16, 1959, of Public Law 86-279 providing for continuation in the Department of the Interior of studies "on the effects of insecticides, herbicides, fungicides, and other pesticides upon fish and wildlife for the purpose of preventing losses of those invaluable natural resources....."

In 1961, an international committee of European and American scientists was organized to coordinate research on the harmful effects of pesticides on wildlife. The same year the President of the United States set up an interdepartmental "Pest Control Review Board" to review all pesticide application programs to insure proper precautions and wise use of pesticides. This board reviews all United States pest control projects contemplated on state and federal lands. Membership includes the United States Department of Agriculture, Department of Defense, Department of the Interior, and the Department of Health, Education, and Welfare. The National Academy of Sciences has established a Pest Control and Wildlife Relationship committee to work out a sound national program of plant protection without causing permanent damage to useful animals and fish.

In addition to research on the effects of pesticides on wildlife and fish in the United States Fish and Wildlife Service, many local agencies are conducting independent research. The United States Department of Agriculture is devoting two-thirds of its research program to biological controls, the use of specific chemicals, attractants, and basic insect physiological and pathological research.

Three-fourths of the United States Forest Service pest control research expenditures are directed to reduce or eliminate harmful effects of chemicals on wildlife and human beings. Included are the use of predators, parasites, resistant tree-breeding, cultural measures, and improved techniques for applying chemicals.

During preplanning phases of pest control projects, the pesticide to be used is carefully selected, its potential effectiveness thoroughly screened, and the effects on wildlife, fish, and other resources critically examined. All

these factors are weighed and the control strategy planned cooperatively around the outcome of these studies. In Section III, the careful appraisal of an entire control project will be reviewed.

III. WHAT A PEST CONTROL PROJECT RECOMMENDATION INVOLVES.

The Proposal

This Section will trace the steps taken, leading to the recommendation for the 1963 Spruce Budworm Control Project on the Targhee and Salmon National Forests; depict the resources involved, and relate something of the careful planning done prior to field control. The story begins back in 1958 when Regional entomologists observed increasing spruce budworm populations in several National Forests contiguous to the Salmon and Snake River headwaters. By 1960 in the Salmon and Targhee National Forest areas, 10,000 acres of Douglas-fir-true fir timber were heavily damaged. The infestation also extended over 226,000 acres of light to moderate damage. The following year, 1961, 430,000 acres of timber were showing serious damage and the light to moderately damaged area had grown to 554,000 acres.

Heavy damage sustained by the trees means nearly complete defoliation in any one year. Two or more years of successive defoliation are frequently sufficient to kill a larger tree. Small trees and reproduction can be killed by a severe defoliation in one year. Thus, considerable losses may be sustained in a timber area receiving severe damage for more than one year.

The 1961 situation was as critical as any that had previously faced the Region. Control measures were recommended using the same methods employed to suppress a similar epidemic successfully in 1955-1957. A control project proposal was sent to the Chief's office of the United States Forest Service in the fall of 1961. However, because of the higher priority of other insect infestations in timber in other parts of the Region and the United States, the project was bypassed.

By the fall of 1962 the Targhee-Salmon National Forest epidemic had grown to involve 1.6 million acres, about half this area being severely infested, with losses imminent in the sawtimber and heavy losses in reproduction. A decision was made to secure financing for about three-fourths of a million acres of the most serious infestation. The Federal Pest Control Review Board had evaluated the project in the spring of 1962 and reviewed it again in the spring of 1963 before approval. Certain adjustments were made to provide greater protection for the other resources. Then in May, the Congress appropriated funds to finance the first phase in control of the insect by aerial spray.

The Resources Involved

1. Douglas-fir and true fir timber. The 750,000 acres threatened contain a sawtimber volume of about 5.3 billion board feet with a stumpage value of 15.8 million dollars and a lumber value of 400 million dollars.

2. All the young trees and reproduction for our future forests with unestimable values.

3. Watersheds which are principal headwaters for the Salmon and Snake Rivers.

4. Forest scenic and recreation resources for the people in 78 communities lying within the infestation zone or tributary to it and for thousands of visitors annually from all parts of the country.

5. Soil, which supports the forests, is the basic resource.

6. The headwaters of the Salmon River contain important chinook salmon spawning grounds.

7. Rich trout and salmon fishing resources attract prople from adjoining States and from all over the United States by the hundreds and thousands.

8. Elk, deer, moose, and mountain sheep provide excellent wildlife resources.

9. Boating down the Middle Fork of the Salmon River and down the Salmon River is considered a supreme sport, nationwide.

10. The area is rich in birdlife, including several of the extremely rare trumpeter swans.

11. Adjacent to the control area are many diversified farms, including dairying and fruit raising.

12. Domestic livestock grazing is a major local industry, the National Forest rangelands providing an important segment of the yearlong forage supply.

Needless to say, the problem of control is an area so rich in human and natural resources is difficult. The timber resource must be protected without causing significant damage to all the other resources.

Evaluation of Possible Control Choices

Several options were available:

1. DDT. Very effective against spruce budworm proven on several major control projects involving millions of acres of forestlands in the West and in Canada. Its side effects are well known and the Forest Service is more familiar with its use than any other pesticide. Costs of application run from $0.75 to $2.00 per acre, depending on methods of application used.

2. Sevin. This material shows promise, but no adequate field tests have yet been made. A decision was made to test its effectiveness against spruce budworm on 10,000 acres of the Targhee National Forest in 1963.

3. Phosphamidon. Another promising pesticide that possesses systemic qualities. It is highly toxic to mammals, but tests have shown it less hazardous to fish than DDT. Cooperative field tests are proposed

to check its suitability. It is expensive, costing probably one and one-half to two times more per acre to spray forest land.

4. Bacillus thuringiensis. The cost is high, running about $15 per acre, and little is known of its effect on spruce budworm. Application is highly complicated and technical. It is being tested. It may be highly selective with few side effects.

5. Do Nothing. This is a poor choice because scenic and recreation values are destroyed, growth of timber is reduced, lumber production is curtailed, fire hazards are increased, watershed values are lost, and reforestation is many times more costly than protection. The old adage of "a stitch in time saves nine" applies here.

After weighing all these possibilities for control against the values at stake and the objectives of the United States Forest Service, certain areas were selected for control using DDT.

Some background for the use of DDT follows:

1948-1958 - Spruce budworm control in Oregon and Washington, 4,900,000 acres were sprayed with one pound of DDT in one gallon of oil per acre. Control was 98 percent effective at a cost of 99 cents per acre.

1955-1957 - Spruce budworm control in Idaho; 2,013,747 acres were sprayed with one pound of DDT in one gallon of oil per acre. Control was 95 percent effective at a cost of 83 cents per acre.

In these projects, less than 10 percent of the forest area was covered. Less than one percent has ever been sprayed twice. The epidemics were controlled, costs were acceptable, and as far as can be determined no significant damage to other resources occurred. Our past record with the use of DDT in spruce budworm control is good. However, this does not mean that we are contented. The search to find safer, cheaper, and better means to control spruce budworm and other destructive forest pests continues.

The Approved Project

After due consideration and approval by the Forest Pest Control Review Board, the 1963 spruce budworm suppression project will comprise the following activities:

1. One hundred ninety thousand acres to be sprayed on the Targhee National Forest at the rate of one pound of DDT per acre. Spray will be modified along streams, lakes, and reservoirs according to two methods as follows:

   a. Cottonwood Creek, Camas Creek, and Howard Creek, Targhee National Forest.

      (1) No spray within one-fourth miles of these streams.

      (2) The next 600 feet, DDT applied at the rate of one-half pound per acre by fixed-wing aircraft.

(3) Remainder of infested area treated at rate of one pound per acre by fixed-wing aircraft.

b. All other Creeks.

(1) No spray within 100 feet of a sensitive area such as fishing streams.

(2) A 300-foot zone adjoining the 100-foot protection zone to be sprayed by helicopter at one-half pound of DDT per acre.

(3) Beyond the 300-foot zone, a 600-foot zone will be sprayed at one-half pound of DDT per acre by fixed-wing aircraft.

(4) The remaining area will be sprayed with fixed-wing aircraft at the rate of one pound of DDT per acre.

2. On the Salmon National Forest, a pilot test project to include salmon-spawning areas will be carried out according to spray pattern b. above. The objective of the test, which will include about 16,000 acres, is to check the feasibility of spruce budworm control in harmony with the protection of the important salmon-spawning areas and other resources in this vicinity. Complete control of the budworm the following year on the critically infested areas will then be reappraised on the basis of these tests. Cooperating with Forest Service scientists in securing the analyzing the data will be experts and scientific personnel from the Idaho State Fish and Game Department and the United States Fish and Wildlife Service.

3. A special test area of 10,000 acres in the Henry's Lake area, Targhee National Forest, will be sprayed with Sevin using adequate controls to test its effectiveness against spruce budworm and its relative effects on fish and wildlife resources. This will also be a cooperative study between federal and state scientists.

IV. THE EFFECTS OF CHEMICAL SPRAYS:

Many questions usually arise from people in, or adjacent to, spray areas and from agencies interested in the resources involved in the control project. Some of those questions most frequently asked will be considered here.

1. How does DDT affect insects or other organisms with which it becomes associated in the environment?

DDT causes poisoning either through contact with the skin or through ingestion inside the organism. If consumed by an animal in continuing doses, the pesticide tends to accumulate in the tissues. However, if only one dose is applied, as in forest insect control projects, it may be temporarily stored in the tissues of other animals contacting it and gradually dissipate. Whereas insects, such as the spruce budworm, are easily killed on contact with minute amounts of DDT on the foliage, dermal applications to warmblooded animals are not normally

hazardous. Insects are also easily destroyed through ingestion of the poison. Most of the effects on animals inhabiting spray areas are sustained through consuming pesticide on forage or other contaminated food.

2. How are the deposits and effects of pesticides measured by scientists?

In two ways: (1) through measurement of a quantity of pesticide ingested by an organism and (2) by measuring the amount of pesticide deposited either on the outside or the inside of the plant or animal.

This latter is expressed on a basis of number of parts of pesticide per million units of the sample material. The common abbreviation for parts per million is p.p.m. and this is frequently seen in reports of scientific studies on the subject. As an example of the way this factor is used, the United States Food and Drug Administration has set up a series of standard "tolerances" or parts per million of pesticide material permissible in marketed food materials. For example, an established tolerance for beef fat in marketed meat is no more than seven parts per million. This means that meat may contain no more than seven units of DDT in every million units of meat put on the market. Naturally, the agency has established this figure as a safe level for human consumption.

The accepted unit of measure for the effects of DDT on animals is LD 50. This means the amount of insecticide required to kill 50 percent of the test animals. It is measured in quantities of insecticide applied in relationship to the weight or the organism or animal. This relationship is expressed in milligrams of insecticide per kilogram of animal weight. For example, the oral LD 50 for laboratory animals ranges from 150 to 300 mg./kg., meaning that a dose of 150 to 300 milligrams of DDT per 1,000 grams of animal weight will kill half the test animals. This same ratio expressed in pounds would be .15 to .30 pounds of DDT per 1,000 pounds of animal weight. In other words, if one were to feed a 1,000 pound cow a third of a pound of DDT every day for a week, the cow would have a 50-50 chance of survival.

3. If DDT gets into a stream, how long will it last?

Spray contamination in streams lasts only a short period. Studies have shown that the greatest amount of stream contamination has occurred within one-half hour after spraying at any one point and that within an hour after spraying, contamination was considerably reduced.

Two things happen to spray in a stream:

a. It moves downstream with the waterflow.

b. It is diluted by mixing with water and becomes less and less dangerous as mixing proceeds by dispersing any concentrations of the material.

DDT has been recorded in stream water as far as 10 miles below a sprayed area. The distance that detectable amounts may persist depends on the amount getting into the stream and the volume of water.

4. What is the effect of DDT on fish and other aquatic life?

Fish can be killed with as little as 0.01 parts per million in the water, aquatic insects with even less. However, the aquatic insects usually repopulate the streams in one to twelve months. Anadromous fish, such as the ocean-going salmon in the headwaters of the Salmon River are very sensitive. These fish must rely on natural methods of regeneration. Such sensitivity requires great caution and careful preparation and handling of aerial application projects to preserve the resource within its natural environment. Special precautions devised to handle this situation on the current project are described in Part III.

It is known that DDT concentrations also accumulate in water algae and current studies are underway to determine how long the chemical remains in plant tissues.

5. How long will DDT last when deposited on forage?

Spray residue will persist for about 30 days on foliage. Where possible, milk cows should be kept away from sprayed forage for 30 days to prevent milk contamination. No hazard should exist for meat animals because designed spray application will not permit the building up in the fat tissue above the accepted tolerance level of 7 parts per million.

6. How much Sevin or DDT would a person or an animal have to eat to cause damage?

No tests have been made of the toxic effects of these two chemicals on human beings. However, in one case, members of two families became ill after eating greens bearing residues of 3,200 parts per million of a chlorinated hydrocarbon. DDT is a chlorinated hydrocarbon. No deaths or permanent afflictions occurred.

Cows have consumed 200 parts per million of DDT in their diet for 18 weeks without serious ill effects.

Sevin is considerably less toxic. Tests have shown that it took 2,000 to 100,000 milligrams of chemical per kilogram of body weight to kill one young bird.

7. What is the effect of DDT on birdlife in the spray area?

There is no evidence that one pound of spray per acre will have any effect on birds. This statement is from observation on many spray projects using the above concentration. However, spraying will kill many of the insects which provide food for birds. Shortage of food usually causes birds to leave the area.

8. Supposing some milk cows are accidentally sprayed or they eat some DDT on their forage. What would be the effect on the milk?

To test the effect, some cows were turned into a sprayed pasture and

the concentration in milk built up to 9 parts per million. After 10 days, 2 parts per million still remained.

Cows turned into the pasture 14 days after spraying showed a maximum of concentrations of 1 part per million in the milk but none after 10 additional days of grazing. Cows turned into the field 30 days after spraying showed no DDT residue in their milk.

The Federal Food and Drug Administration will not permit milk to be sold if it contains any DDT residue.

9. How long would DDT last if stored in animal tissue?

About 50 percent remains after one month, 25 percent after three months if no more DDT is consumed. The amount remaining stored in animal tissue depends upon the level of ingestion and the length of time over which the intake occurs. Large doses accumulate in the tissues more rapidly than small doses.

10. Is there an intake level at which no fat storage of DDT occurs?

Accumulation in fat is possible from a 1 part per million level in the food.

11. Is age related to fat storage of DDT?

Fat storage of DDT is at the same rate in weanlings and four-month old rats.

12. What is the lowest level of intake at which DDT may produce pathological effects?

Evidence of liver injury has been noted in rats consuming diets containing 5 parts per million DDT for four to six months.

13. How much DDT is sprayed at a one-pound per acre rate?

If the application rate is one pound per acre and the amount falls on one acre-foot of water, the DDT concentration in the water would be 0.375 parts per million.

14. Why aren't some safer controls developed, like the use of parasites, predators, or insect disease?

Tests are being conducted in 1963 on all spruce budworm control projects in the West to try to find a method by which budworm populations can be satisfactorily reduced with less danger to fish, wildlife and man. Various specific biotic and systemic chemicals are being tried. Also, a wide research program on natural enemies continues, and safer methods of pesticide application are constantly being developed.

In reviewing the answers to the above questions, it must be remembered that specific information on the effects of pesticides is limited, primarily be-

cause the science of pesticide toxicology is a new science, much of it developed only since the advent of modern agricultural chemical industry after World War II. The above answers are based on the best information obtainable. There is a wide variation in test results, depending on the conditions under which the tests were made, and of course no two control operations present the same set of conditions. This is the reason for developing an entirely new control system for each infestation or disease outbreak where resource protection is required in the public interest.

V. THE PUBLIC'S STAKE IN PEST CONTROL

Americans are the most efficient, productive people in the world. They continually direct their efforts toward producing crops, livestock, forest products, and other commodities on fewer acres with less labor and at lower cost. Nineteen out of twenty Americans live and work in towns and cities and are not involved with agriculture and forestry. These commodities in abundance have become an accepted way of life.

Here are a few reasons for this affluence:

1. Adequate quarantine services to prevent the introduction of foreign insect and disease pests.

2. Successful eradication programs for both pests, human, and animal parasites.

3. Cooperation among Federal, State, and private agencies in prosecuting research and eradication campaigns.

4. Chemical control measures.

5. Biological control measures.

6. Basic research programs.

7. Silvicultural and management controls.

Regardless of these measures and activities to hold pest losses to low levels, damage to agricultural crops and forest resources are costly, requiring the expenditure of between ten and twenty billion dollars annually. At the same time, the Nation enjoys the following results from expenditures to reduce pest damage:

1. The food and forest product dollar buys two to three times more than it would without pest protective measures.

2. Lumber is in good supply and cheaper than if a high rate of pest damage were allowed to continue.

3. Many foods and forest products would be luxury items were it not for pest controls.

As in other forest management and protection activities, control programs are coordinated with overall multiple use administration to insure balanced land management, For example, the application of a pesticide must be checked for any effect it may have on fish, wildlife, grazing animals, and humans utilizing the same areas. A ceaseless vigil is essential to detect threatening organisms. To maintain a healthy industry sustained on a continuous flow of products is vital to the Region's economy. This in turn helps stabilize communities. Protection of the esthetic values and watershed functions are other dividends of a good insect and disease suppression program.

VI. THE REGIONAL ORGANIZATION FOR FOREST PROTECTION FROM PESTS

It is the function of the Regional Division of Timber Management to provide through the Regional Forester to the Forest Supervisors of the eighteen Intermountain National Forests adequate prevention, detection, and evaluation services for the destructive insect and disease pests, and to coordinate these and suppression activities with the respective state, private, and other Federal personnel. These services are centered in three sections of the Branch of Forest Insect and Disease Prevention and Control, 509 Kiesel Building, Ogden, Utah. Briefly, their activities are described as follows:

Detection and Evaluation Section:

1. Conduct annual aerial detection surveys, covering all Intermountain National Forest timbered areas as well as the Department of the Interior forested lands by cooperative agreement. Detection on state or other lands are made on request and reported promptly.

2. Aerial surveys are followed by biological evaluations on the ground whenever suspected pest activities are detected from the air or reported by others. These evaluations appraise the current and potential significance of an insect outbreak.

3. Biological evaluations are made on other than National Forest lands upon request from other Federal, state, local, or private land managers or owners. Training services are also provided for personnel from these agencies.

4. An annual report and summary of current insect situation and potential is provided to all owners and managers of forest lands in the Region.

Insect Control Section:

1. Secure or provide technical advice and assistance on insect control projects in Region Four and on other Federal, state, or private forest lands.

2. Maintain a comprehensive knowledge of modern pesticides, chemical and biological controls, and pest control equipment.

3. Guide operational ground surveys and handle biological problems encountered on control projects.

4. Report annually on recommended pest control projects and accomplishments.

5. Make inspections of control projects to assure that satisfactory control methods are followed and that control is effective.

Forest Pathology Section:

1. Direct National Forest disease detection, evaluation, and surveys and advise feasible control measures.

2. Provide technical advice on diseases and assistance on disease control projects in the Region and on other Federal, state, or private lands.

3. Work cooperatively with other Forest Pathologists and disease control workers to reduce the overall disease potential.

4. Maintain a comprehensive knowledge of forest diseases, disease-insect relationships, and biological systemic disease controls.

5. Make inspections of control projects.

The Regional Forester by the above means, provides the specialized services and aids required by the Forest Supervisors on the eighteen National Forests of the Intermountain Region to accomplish the control within tolerable limits of the destructive array of forest pests. Prevention and control activities extend over nearly thirty-one million acres of National Forests and on other forest lands when the land managing agencies request these services. The Forest Pest Control Act of 1947, provides for the cooperative protection of all forest lands against forest pests as follows:

Federal Forest Pest Control Act of 1947

Public Law 110 - 80th Congress

Chapter 141 - 1st Session

(S. 597)
(61 Stat. 177)
An Act

To provide for the protection of forests against destructive insects and disease, and for other purposes.

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That in order to protect and preserve forest resources of the United States from ravages of bark beetles, defoliators, blights, wilts, and other destructive forest insect pests and disease, and thereby enhance the growth and maintenance of forests, promote the stability of forest-using industries and employment associated therewith, aid in fire control by reducing the menace created by cying and dead trees injured or killed by insects or disease, conserve forest cover on watersheds, and protect recreational and other values of forest, it shall the the policy of the Government of the United States independently and through

cooperation with the governments of States, Territories and possessions, and private timber owners to prevent, retard, control, suppress, or eradicate incipient, potential, or emergency outbreaks of destructive insects and diseases on, or threatening, all forest lands irrespective of ownership.

Sec. 2. The Secretary of Agriculture is authorized either directly or in cooperation with other departments of the Federal Government, with any State, Territory, or possession, organization, person, or public agency, subject to such conditions as he may deem necessary and using such funds as have been, or may hereafter be, made available for these purposes, to conduct surveys on any forest lands to detect and appraise infestations of forest insect pests and tree diseases, to determine the measures which should be applied on such lands, in order to prevent, retard, control, suppress, or eradicate incipient, threatening, potential, or emergency outbreaks of such insect or disease pests, and to plan, organize, direct, and carry out such measures as he may deem necessary to accomplish the objectives and purposes of this act: Provided, That any operations planned to prevent, retard, control, or suppress insects or diseases on forest lands owned, controlled, or managed by other agencies of the Federal Government shall be conducted with the consent of the agency having jurisdiction over such land.

Sec. 3. The Secretary of Agriculture may, in his discretion and out of any money made available pursuant to this act, make allocations to Federal agencies having jurisdiction over lands held or owned by the United States in such amounts as he may deem necessary to retard, control, suppress, or eradicate injurious insect pests or plant diseases affecting forests on said lands.

Sec. 4. No money appropriated to carry out the purpose of this act, shall be expended to prevent, retard, control, or suppress insect or disease pests on forest lands owned by persons, associations, corporations, States, Territories, possessions, or subdivisions thereof until such contributions toward the work as the Secretary may require have been made or agreed upon in the form of funds, services, materials, or otherwise.

Sec. 5. There are hereby authorized to be appropriated for the purpose of this act such sums as the Congress may from time to time determine to be necessary. Any sum so appropriated shall be available for necessary expenses, including the employment of persons and means in the District of Columbia and elsewhere, printing and binding, and the purchase, maintenance, operation, and exchange of passenger-carrying vehicles; but such sums shall not be used to pay the cost or value of any property injured or destroyed. Material and equipment necessary to control, suppress, or eradicate infestations of forest insects or tree disease may be procured without regard to the provisions of section 3709 of the Revised Statutes (41 U. S. C. 5) under such procedure as may be prescribed by the Secretary of Agriculture, when deemed necessary in the public interest.

Sec. 6. The provisions of this act are intended to supplement, and shall not be construed as limiting or repealing, existing legislation.

Sec. 7. This act may be cited as the "Forest Pest Control Act."

Approved June 25, 1947.

VII. A CHECKLIST OF THE REGION'S SERIOUS FOREST INSECTS AND DISEASES:

Insects

1. MOUNTAIN PINE BEETLE
   Dentroctonus monticolae Hopk.
2. SPRUCE BUDWORM
   Choristoneura fumiferana (Clem.)
3. ASPEN LEAF TIER
   Sciaphila duplex (Wlsh.)
4. LARGE ASPEN TORTRIX
   Choristoneura conflictana (Wlk.)
5. PINYON NEEDLE SCALE
   Matsucoccus acalyptus Herbert.
6. DOUGLAS-FIR BEETLE
   Dendroctonus pseudotsugae Hopk.
7. ENGELMANN SPRUCE BEETLE
   Dendroctonus engelmanii Hopk.
8. GREAT BASIN TENT CATERPILLAR
   Malacasoma fragile (Stretch)
9. TUSSOCK MOTHS
   Orgyia spp and Hemerocampa psedotsugata McD.
10. MEALYBUGS
    Puto spp.
11. ASPEN LEAF MINER
    Phyllocnistis populiella Chamb.
12. LODGEPOLE PINE NEEDLE MINER
    Recurvaria milleri Busck.
13. TUBE MOTH
    Argrotaenia sp.

Diseases

WESTERN DWARFMISTLETOE
Arceuthobium campylopodum forma campylopodum (Engel.) Gill

SOUTHWESTERN DWARFMISTLETOE
Arceuthobium vaginatum forma cryptopodum (Engel.) Gill

DOUGLAS-FIR DWARFMISTLETOE
Arceuthobium douglasii Engelm.

LODGEPOLE PINE DWARFMISTLTOE
Arceuthobium americanum (Nutt.) ex. Engelm.

DWARFMISTLETOE OF LARCH
Arceuthobium campylopodum forma laricis (Piper) Gill

RED RING ROT
Fomes pini (Brot. Ex Fr.) Karst

ROOT AND BUTT ROT
Fomes annosus (Fr.) Cke.

BROWN CRUMBLY ROT
Fomes pinocola (Sw. ex Fr.) Cke.

BROWN STRINGY ROT
Echinodontium tinctorium Ell. and Ev.

ASPEN HEART ROT
Fomes igniarius (L. ex Fr.) Kicky.

COMANDRA RUST
Cronartium comandrae Pk.

WESTERN GALL RUST
Peridermium harknessii Moore

LIMB RUST
Peridermium filamentosum Pk.

14.	FALL CANKER WORM Alsophila pometaria (Harris)	YELLOW WITCHES'BROOM Melampsorella caryophyllacearum Schroet.
15.	SPRING CANKER WORM Paleacrita vernata (Peck)	SPRUCE BROOM RUST Chrysomyxa arctostaphyli Diet.
16.	FIR ENGRAVER Scolytus ventralis Lec.	ASPEN CANKER Cytospora chrysosperma Pers. ex. Fr. or Valsa sordida Nits.
17.	WESTERN BALSAM BARK BEETLE Dryocoetes confusus Sw.	PINE NEEDLE CAST Elytroderma deformans (Weir) Darker
18.	ENGRAVER BEETLES Ips spp.	ASPEN LEAF BLIGHT Marssonina populi (Lib.) Magn.
19.		DOUGLAS-FIR NEEDLE CAST Rhabdocline pseudotsugae Syd.

Targhee National Forest
Dubois, Idaho

MR

For Immediate Release
Monday July 15, 1963

The half-way point in the U. S. Forest Service aerial spray program to control critical infestations of spruce budworm on areas of the Targhee National Forest, was announced Sunday by Richard C. Stemple, project leader.

Operations began with first flights Wednesday July 10.

Stemple reported that about 100,000 acres of infested Douglas Fir timberland will have been sprayed by Monday evening July 15, weather permitting. An early morning rain Sunday closed operations about 8:00 a.m.

Flights also began Sunday on an experimental spraying of 10,000 acres in the Henry's Lake area, Targhee National Forest, to sample the effectiveness of a new pesticide called Sevin. The pilot project under direction of Entomologist Jerry A. E. Knopf is designed to field check previous tests which showed it to possess a high safety factor for fish. "If this is found true", Stemple said, "and the product measures up to DDT against spruce budworm, then we will have made a real advance in our knowledge of how to handle pesticides for the greatest benefit to all the values involved."

Aircraft on the project are now covering between 20,000 and 30,000 acres of infested area daily.

No final figures on the amount of budworm kill have been developed, but Entomologist Knopf has reported it highly satisfactory in areas receiving adequate spray treatment. Ninety-five percent kill is rated effective control by the Forest Service.

Flights continue for six consecutive days followed by one day of rest for the pilots as an added safety measure. Gary White, project Safety Officer reported no lost-time accidents on the project at the half-way point.

The total project control area is 200,000 acres.

July 9, 1963
-mk

Immediate Release
Targhee National Forest News Release

SPRUCE BUDWORM CONTROL WILL BEGIN ON TARGHEE NATIONAL FOREST

The 190,000 acre planned aerial pesticide spraying program to suppress a serious epidemic of spruce budworm begins Wednesday on the Targhee National Forest it was reported Tuesday to Forest Supervisor Alvin Wright by control project leader, Richard Stemple.

Duration of the program will hinge entirely on weather conditions. "Successfull control of the forest pests depends on dry, calm weather", Supervisor Wright reported. "Spray is applied during the early morning hours because optimum atmospheric and wind conditions prevail then."

To complete the project with highest efficiency according to prescribed methods it is planned to use several types of aircraft. Two B-17 planes each will carry 2000 to 2200 gallons of pesticide per trip. For more rugged mountains one C-39, a twin-engine Douglas, and a TBM are to be used. These aircraft carry lesser amounts of spray fluid and are more maneuverable in rough topography. The TBM is a converted navy torpedo bomber.

Also used to apply the pesticide along stream bed areas will be a helicopter with a 70 gallon capacity. Excellent control over spray application and drift is obtained along critical stream and lake shore areas, it has been found. This type of application provides maximum protection to fish and other aquatic life. No insecticide is applied on a 100 foot strip along each side of the stream as an added precaution to prevent insecticide from getting into the stream.

Insectide applied in the amounts being used on the project have been observed to be harmless to wildlife and humans it was stated.

"All spray is being flown from the airfield at Dubois, Idaho where the Forest Service has established its operational headquarters for this project," Supervisor Wright said. Spray distribution is being checked by entomologists who are using a system of spray-deposit cards. The public is cautioned to leave these small red cards in place if seen in the timered areas, because of vital information they contain.

Supervisor Wright said that the project is designed to halt the epidemic before extensive stands of mature trees are killed and still be certain that no permanent damage is done to the fisheries resource. There will be no need for a crash timber salvage program such as occurs when bark beetles strike or after a blowdown.

Another phase of the project slated to begin about July 15 is the experimental spraying of 10,000 acres with a newly-developed pesticide called Sevin. Previous small scale experiments have shown this pesticide to have promise of effective control of spruce budworm but with an added advantage of being less lethal to fish and aquatic life. "This is in line with Forest Service policy to keep up-to-date on the safest, most effective pesticide available, thus assuring highest protection for the multiple resource values at stake during forest insect and disease uprisings," Supervisor Wright stated.

Project leader, Richard Stemple estimated that under favorable weather conditions control would be completed in ten days.

Actively participating are the Idaho Fish and Game Department, The Federal Aviation Agency, The Idaho Department of Forestry, and the U. S. Weather Bureau.

ROUGH DRAFT
VCGoodwin:sw
July 1, 1963

Forest Supervisor Powers today announced successful completion of test spraying to control spruce budworm in the North Fork area of the Salmon National Forest.

Spraying on the Salmon Test Unit, under the overall leadership of Richard C. Stemple of the Forest Service, was directly supervised by Orlo Johnson, District Ranger, Salmon National Forest. Technical entomological direction was provided by Jerry Knopf, of the Branch of Forest Insect and Disease Prevention and Control, Division of Timber Management, Ogden. Unit Air Officer was Tom Farr, Salmon National Forest. Gary White of the Boise National Forest served as Project Safety Officer, and Jack Adams, Wildlife Biologist of the Cache National Forest, was Wildlife Consultant for the Forest Service.

Cooperating agencies on the project were represented by Al Witter, FAA, Boise, and Carl Syverson, U. S. Weather Bureau, Boise. The Idaho Fish and Game Department's part in the evaluation of the spray application technique was under the supervision of Ted C. Bjornn. Hillcrest Aircraft Company, Lewiston, Idaho, provided the aircraft and pilots for the actual spraying operation.

The spray work was carried out by helicopter and fixed-wing aircraft on 16,200 acres of infested Douglas-fir and true fir stands in the Hughes Creek drainage, a tributary to the North Fork of the Salmon. Maximum protection to the salmon-spawning areas along Hughes Creek was provided

during the spraying operations. To insure this protection, previous spraying techniques were modified. A 100-foot strip was left unsprayed on each side of the salmon waters and the adjacent 100-foot strips were sprayed with reduced pesticide applications by helicopters and fixed-wing aircraft.

Spray distribution was checked by the use of test cards placed throughout the treated area. Spray concentration rates in the stream waters were determined by collecting water samples periodically at preselected locations. Under the direction of Mr. Bjornn, determination of the effects of DDT concentration in the water was divided into several phases by the Idaho Fish and Game Department, including the following:

1. Live boxes containing salmon and trout fingerlings were placed in the test area and "control" streams.
2. Stream bottom sampling of aquatic insects was undertaken at three test and three "control" stations.
3. Fish were collected for determination of DDT in the tissue, both before and after spraying.

Results will be reported when analyses are completed.

Supervisor Powers stated that there had been some misunderstanding about the effects of this insect on the trees attacked. Questions asked about it indicate that there are some who visualize vast areas of dead sawtimber-size trees standing wasted in the woods. "This is not the case," said Mr. Powers. "The mature timber is threatened, but the spruce budworm is a slow killer. Development of modified spray techniques will permit us to halt the epidemic before extensive stands of mature trees are killed, and still be certain no

permanent damage is done to the fisheries resource. There is no need for a crash timber salvage program, as is the case when bark beetles or windstorms have created havoc."